ESC201T: Introduction to Electronics

HW -5 **Date: 7.10.2020**

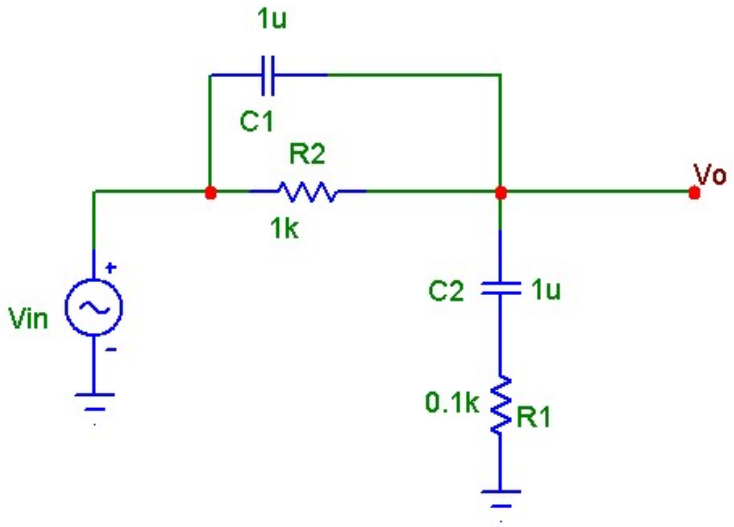
Q.1 An amplifier has a transfer function of the form $G(\omega)=\frac{V_O(\omega)}{V_{in}(\omega)}=\frac{100\times j(\omega/\omega_L)}{\{1+j(\omega/\omega_L)\}\{1+j(\omega/\omega_H)\}}$. Sketch Bode plot of the transfer function and determine suitable values for corner frequencies such that amplifier can amplify audio frequencies in the range 20-20KHz equally well.

Q.2 There is a low pass filter whose transfer function is of the form $|H(f)|=\frac{1}{\sqrt{1+(\frac{f}{f_o})^{2N}}}$. There is a signal with 1KHz and 10KHz sinusoids of equal magnitude. We would like to reject the 10KHz sinusoid. Determine suitable value for fo and N such that magnitude of 10KHz is -60dB lower as compared to 1KHz signal after passing through the filter.

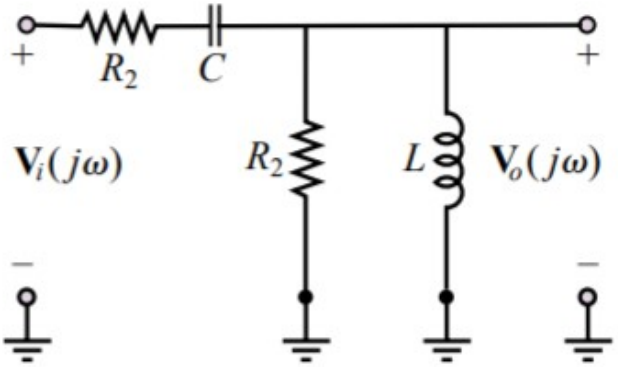
Q3 Draw the magnitude and phase Bode plots of the transfer function given below, for ω ranging between 0.01 rad/ sec to 100 rad/sec.

$$H(j\omega)= 2\, j\omega \,/\, [\, 10\,(j\omega)2 + 25\,(j\omega) + 10\,]$$

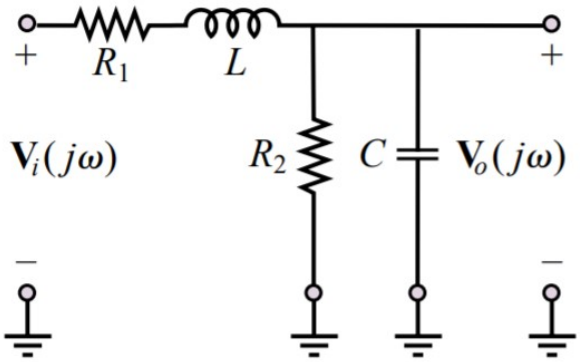
Q.4 Derive the transfer function and sketch the Magnitude Bode plot of the circuit shown below



Q.5 Determine the nature of filter for the circuit shown below



Q.6 Determine the transfer function and sketch the Bode plot for the circuit shown below



$L = 11\ \text{mH}$ $\quad C = 0.47\ \text{nF}$

$R_1 = 2.2\ \text{k}\Omega$ $\quad R_2 = 3.8\ \text{k}\Omega$